

XLVI. *The Description of a New Hygrometer, invented by James Ferguson, F.R.S.*

Read Nov. 8, 1764. **I**N this machine (TAB. XVI. Fig. 1. and 2.)

AAAA is a frame of wainscot or mahogany, grooved in the innermost edges of the two longest sides, for holding a pannel BBBB of white deal-board, without pinching it. The pannel is about the thickness of a crown piece, and fifteen inches in length, cross-wise to the grain of the wood. The middle part projects outward from the upper and lower edges, at C and C, where it is fastened into the frame by two screws, to keep the middle part always in the same place, whilst the rest of the pannel expands by moist air toward both ends of the frame, and contracts toward the middle when the air is dry. F is a pin fixt into the pannel near one of its ends, and a round pin is fixt near the other end of the pannel, on which the large pulley H turns, and also the small pully G which is fixed to H. One end of a small flexible cord DE is fastened to the pin F, and the other end goes round the pully G, and is fixt into the bottom of its groove, as at *b*. One end of another small cord IK is fixed into the bottom of the groove of the large pulley H, as at *a*, from which it goes round the part *a* i H; and in its way thence to M it goes round a small pulley L, in which an axis is fixt, and turns in the piece O, which lies above the pulley, and is screwed to the upper side of the frame at C. This cord goes over the pulley M (which turns on a round pin fixt into the pannel) and has a flattish weight N hung to it.—The pullies G and L are of equal diameters in their grooves, which is only equal to a tenth part of the diameter of the large pulley H in its groove. The pulley M may be of any convenient size.

Now it is plain, that as much as the pannel expands between F and G, so much will the pully G be removed farther from the pin F; and just so much will the cord DE turn the pulley G backward; and any point in the

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groove

groove of the pulley H ten times as much, because it is ten times the diameter of G in the groove: and this motion will cause the cord I K to turn the pulley L (and draw up the weight N) ten times as much as the pulley G is turned. So that, if the pannel expands a tenth part of an inch, by moist air, the pulley L will be turned quite round: and half round if the pannel expands but a 20th part of an inch: As the air grows dry, the pannel contracts, and the weight M descends and turns all the pullies the contrary way.

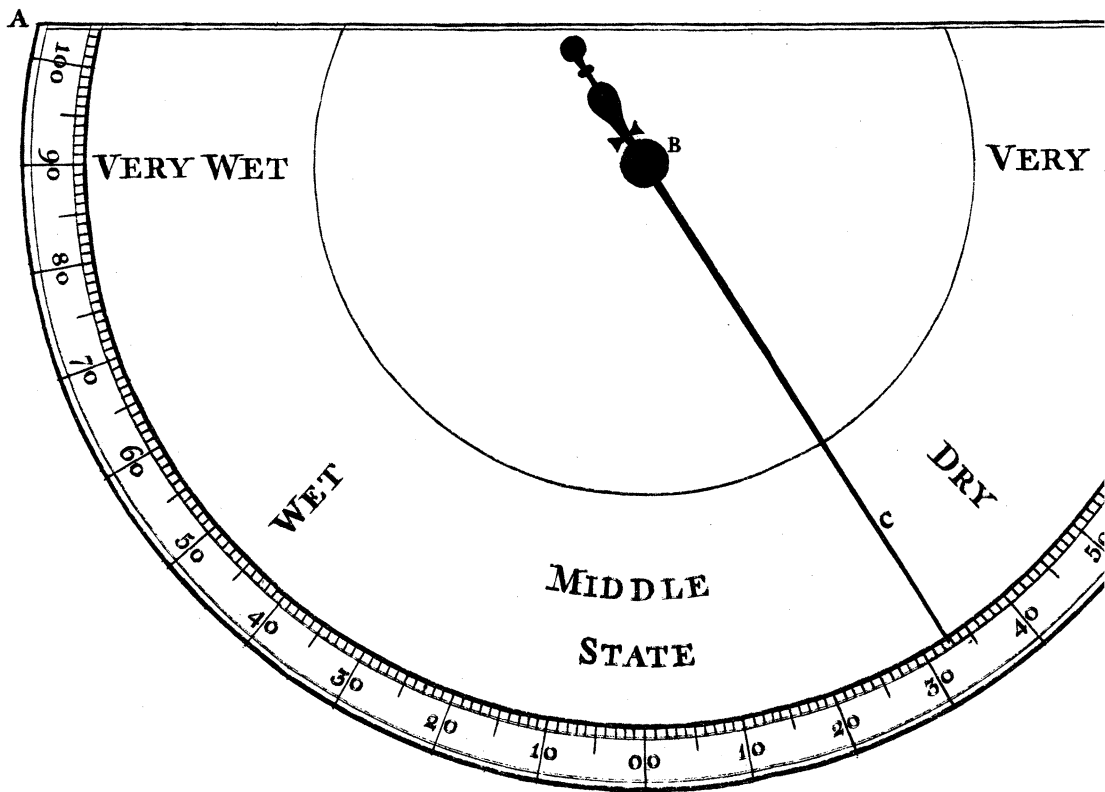
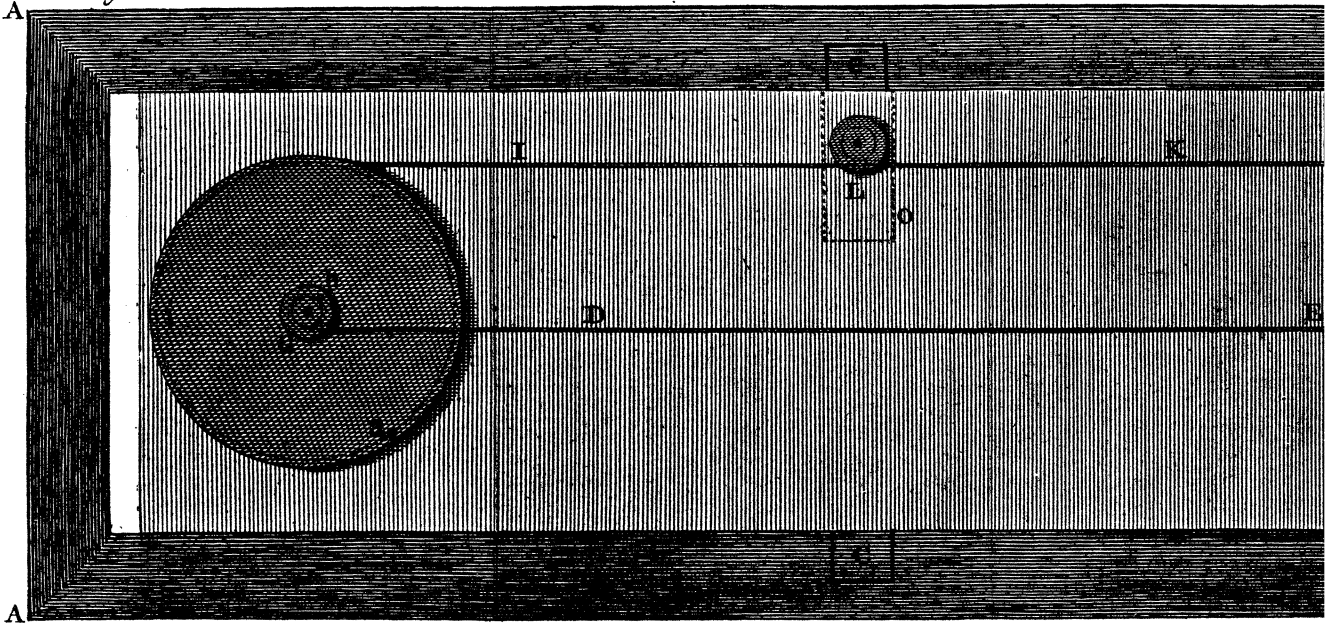
The back of the plate A A (Fig. 2.) is screwed to the other side of the frame (Fig. 1.) so as the straight edge of the plate may be even with the uppermost side of the frame, and the center B (Fig. 2.) may be directly over the center of the pulley L (Fig. 1.) on whose axis the index BC (Fig. 2.) is fixed. And as the pulley L is turned by the cord I K, the index will be moved on the plate, and shew the degrees of moisture or dryness of the air.

If the expansion and contraction of the pannel be so great as to move the index beyond the limits of the degrees on the plate, this may be remedied by putting on a larger pulley at L. — But if not great enough, in very wet and very dry weather, to move the index through all the degrees on the plate, the pulley L must be made less in diameter accordingly.

N. B. In three or four years at most, a new pannel should be put into the frame: because, when the old one has been so long exposed to the air, it will almost cease to be affected thereby. And therefore, a large thick piece of deal should be kept in reserve for that purpose; and about the thickness of a card always planed off that side from which the new pannel is to be taken.

At G and M, there must be small knobs of some hard wood glued on the back of the pannel below the graduated plate, to make a proper thickness for holding the wires upright and fast on which the pullies G and M do turn: for otherwise, the wires would soon loosen in the pannel.

Fig. 1.

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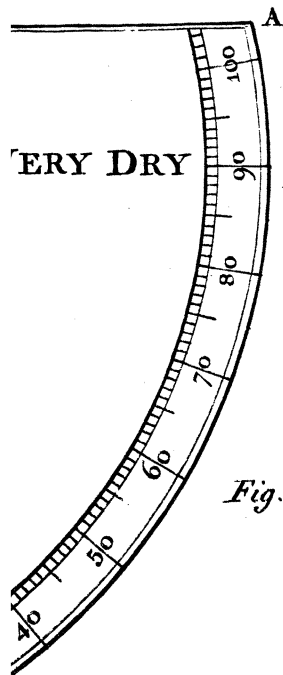
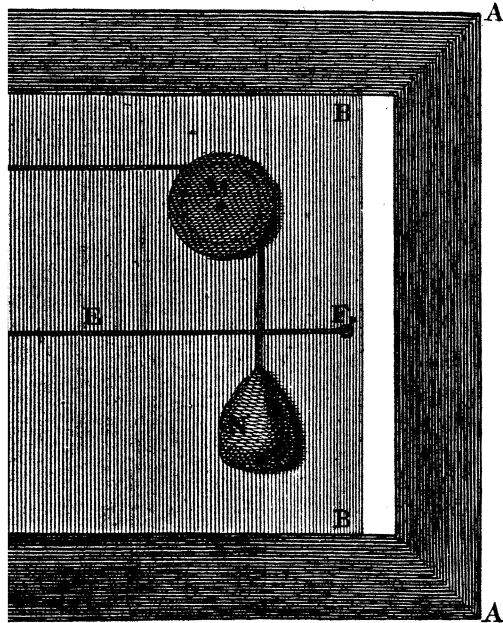


Fig. 2.

Fig. 1.

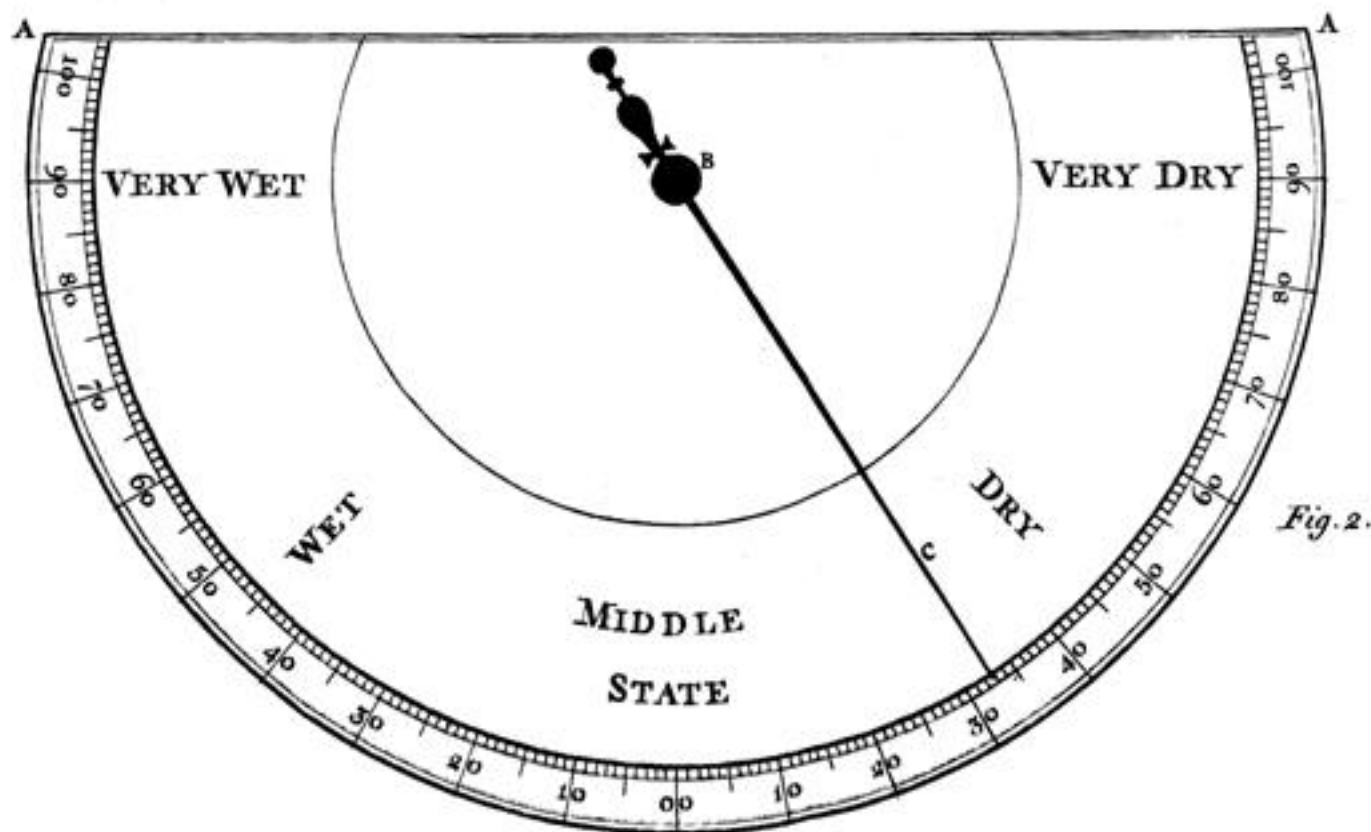
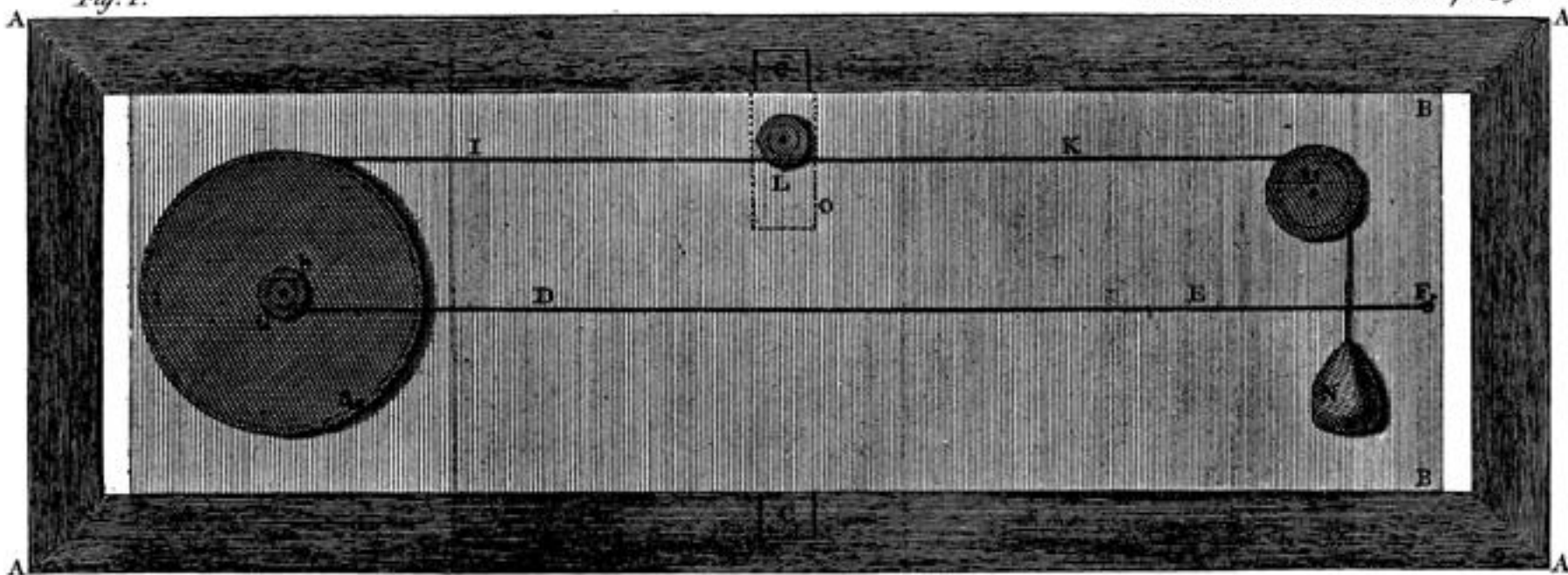


Fig. 2.